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EVALUATION OF THE CLEVELAND CHILD DEVELOPMENT PROGRAM. A LONGITUDINAL STUDY (FIRST YEAR REPORT).

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CLEVELAND PUBLIC SCHOOLS, OHIO

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IN ORDER TO EVALUATE THE EFFECT OF A STRUCTURED PRESCHOOL ACADEMIC PROGRAM UPON THE COGNITIVE GROWTH OF CULTURALLY DEPRIVED CHILDREN, A LONGITUDINAL STUDY WAS BEGUN ON 107 FOUR-YEAR-OLDS IN CLEVELAND, OHIO. RELEVANT RESEARCH LITERATURE WAS REVIEWED IN DESIGNING THE STUDY. THE FIRST PHASE, RECOUNTED IN THIS REPORT, EXPLORED PSYCHO-LINGUISTIC, PERCEPTUAL, AND INTELLECTUAL FUNCTIONING. THE CHILDREN WERE DIVIDED INTO ONE CONTROL GROUP RECEIVING CUSTODIAL CARE AND TWO EXPERIMENTAL GROUPS, ONE WHITE AND ONE NEGRO, BOTH BELONGING TO THE PUBLIC SCHOOL CHILD DEVELOPMENT PROGRAM. PRE- AND POSTTESTING OCCURRED AT A 10-WEEK INTERVAL, USING THE STANFORD-BINET INTELLIGENCE SCALE (S-B) AND THE ILLINOIS TEST OF PSYCHOLINGUISTIC ABILITY (ITPA). A SECONDARY RESEARCH PROJECT USED THE FROSTIG TESTS TO MEASURE 45 CHILDREN, RANDOMLY SELECTED FROM THE THREE GROUPS, WHO HAD BEEN GIVEN ADDITIONAL PERCEPTUAL TRAINING. DATA WERE ANALYZED IN TERMS OF PRESCHOOL OR NONPRESCHOOL AND BOYS OR GIRLS. RESULTS SHOWED THAT (1) S-B AND ITPA ARE MORE STABLE MEASURES THAN FROSTIG AT THIS AGE, (2) GAINS WERE GREATER IN BRIGHTER CHILDREN, (3) EXERCISE IS NEEDED IN VOCALIZING EXPERIENCE, (4) GIRLS SURPASS BOYS IN LANGUAGE DEVELOPMENT, AND (5) VISUAL PERCEPTION IMPROVED AFTER USING THE FROSTIG PROGRAM. A FAIRLY EXTENSIVE BIBLIOGRAPHY IS INCLUDED. (LG)

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CLEVELAND CHILD DEVELOPMENT PROGRAM

first year report a longitudinal study

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EVALUATION

OF THE

CLEVELAND CHILD DEVELOPMENT PROGRAM

A

LONGITUDINAL STUDY

First-Year Report

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1966

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SECTION I

INTRODUCTION

Today cognitive functions--such as acquisition and use of language, meaningful organization of perceptual experiences, and those abilities which fall under the general rubric of intelligence--are recognized not as fixed, inherited capacities but rather as dynamic processes which can be stimulated or stunted by experience. Early childhood is a crucial time in the development of these functions which appear later to be highly related to school performance. Children living in high risk poverty areas particularly suffer experiential deficiences related to these functions.

The primary purpose of the longitudinal study reported here is to evaluate the effect of a structured pre-school academic program upon the cognitive growth of culturally deprived children. The initial investigation explores patterns of psycho-linguistic, perceptual, and general intellectual functioning of culturally deprived children as they relate to pre-school experiences. This pool of data will then be used to follow development of these children through the lower elementary grades.

This preliminary report is on the first phase of the study. One hundred and two children were administered the Stanford-Binet Intelligence Scale and the Illinois Test of Psycholinguistic Ability (ITPA). The children had been divided into three groups. An experimental group from each of two developmental centers in the Child Development Program of the Cleveland Public Schools was involved in the study. A third group, the control, received only daily custodial care in four nurseries chosen for their proximities to the centers from which the experimental groups came. All the children involved in the study were within the age range 4 years 0 months to 4 years 11 months when testing began. A pre-post test design with each child as his own control was used. The pre-post testing interval consisted of ten weeks.

A secondary research project was also conducted. A sub-experimental group of 15 children was randomly selected from one of the experimental groups. It underwent an additional training program designed to develop certain perceptual areas believed to be related to a child's ability to learn and adjust. The Marianne Frostig Developmental Test of Visual Perception was administered prior to and after the treatment. A sub-control group of 30 children did not receive this training, but they were given the Frostig Test in the same pre-post testing interval.

Mean gains on the Stanford-Binet and the ITPA were analyzed in terms of pre-school vs. non pre-school and boys vs. girls. Since two experimental groups were being compared, it was possible to evaluate indirectly instructional differences. For the purpose of analyzing the relationships among the various scales and sub-scales, intercorrelations were computed.

The second phase begins in March, 1967. The children involved in the first phase of the study will be followed into the Cleveland School System where it is anticipated that the majority will be in kindergarten. The same psychological tests administered in the first phase will be used. In addition, reading readiness will be introduced as well as demographic information relative to family structure collected.

Development of these children hopefully can be followed longitudinally through subsequent lower elementary grades. Goals of this secondary aspect will be:

1. To explore the stability of changes found in the first phase.
2. To study the relationship between first phase test patterns and changes on subsequent school performance.
3. To assess the test-retest reliability of the various scales employed.
4. To analyze differences between children from intact families and children from broken homes.

What are the implications of this research? It is anticipated that this longitudinal investigation will help bring knowledge to such practical and theoretical areas as:

1. Stability of IQ measures at these early ages.
2. Effects of early linguistic and perceptual training on later performances.
3. Possibility of developmental differences created by exposure or non-exposure to academic treatment in early life.
4. Extent to which these differences, if any, may be related to sex.
5. The contribution of family structure to cognitive functioning.
6. New techniques for establishing rapport and using informal means of motivating culturally deprived children.
7. Empirical rationale for future curriculum development at the pre-school level.

SECTION II

REVIEW OF THE LITERATURE

In 1950, approximately one child out of every ten in the 14 largest cities in the United States was culturally deprived. By 1960, this figure had increased to one in three. It is estimated that by 1970 there will be one deprived child for every two enrolled in the schools (Riessman, 1962).

The Culturally-Deprived Child

Riessman commented that such terms as deprived, handicapped, and disadvantaged are unfortunate in that they emphasize environmental limitations and ignore elements of strength, "the positives," the constructive efforts of low income sub-cultural groups.

What is cultural deprivation? When the deprived child comes to school, he is often disinterested, unmotivated, restless, and perhaps impulsive. This behavior is usually interpreted from an unsympathetic middle class frame of reference. From this reference, it is difficult to understand the various factors inherent in the lower socioeconomic subculture, perhaps compounded by ethnic minority status. It may well be that this child is tired, hungry, undernourished, or just plain ill (Deutsch, 1963). He comes from a home where meals are irregular and knowledge about proper diet is absent. Breakfast for him may well mean a bottle of pop and a bag of potato chips. Two, three, or four children may sleep in the same bed (one of them may wet it). Sanitary facilities may be inadequate or lacking. The chances are that his home is crowded, noisy, busy, and overly active. Privacy for work or play is unknown to him.

His view of society is limited to that of his immediate family and neighborhood. His early conditioning is influenced by the constant struggle for survival of those around him. Many of the behaviors he displays which are sanctioned by his sub-culture may be unacceptable by society at large. Conversely, any steps the child takes in the classroom toward assimilating the values of the social mainstream may put him in conflict with his subculture. Most people in his environment feel that they do not have a chance for education and even if they had the chance, they could not succeed. Perhaps to the contrary, an attitude of pragmatic anti-intellectualism may prevail.

Adverse Influence on Cognitive Development

Before the average child enters school, the cerebral cortex has already developed systems of sorting, relating, interpreting, and perceiving experience. This implies that the structure and foundation for intellectual growth are set early in life.

Reciprocal interaction with the environment helps children develop what has been called cognitive structures. The term "cognitive" implies all the various modes of knowing. It means perceiving, interpreting, evaluating the world around them. The assimilation of knowledge that comes through our sensory equipment is a cognitive function. Variety in the environment seems to be essential to the development of these functions. James McV. Hunt (1961) stressed the importance of environmental variety:

> The greater the variety of situations in which a child must accomodate his behavioral structures, the more differentiated and mobile he becomes.

> The more new things a child has seen and the more he has heard, the more things he is interested in seeing and hearing.
>
> The more variations in reality with which he has coped, the greater his capacity for coping.

Hebb (1949) pointed out the differences in activity and exploratory behavior which exist between animals reared in a very stimulating environment and those reared under very confining conditions. He found that these differences in initial behavior have considerable significance as determinants of activity and intelligence of these animals at later stages of development.

Most theories based on "critical stages" (Freud, Piaget, Gesell, Havighurst) reach consensus in placing one period of development as basic to the next which, in turn, influences and determines later development.

Much evidence is available pointing to the importance of early visual, perceptual, and vocal auditory stimulation toward the development of later cognitive functions and learning potential (Bernstein, 1961; Deutsch, 1963, 1964a, 1964b; Deutsch and Brown, 1964; B. S. Bloom, 1964; Bruner, 1960, 1964; McCandless, 1952; Semler and Iscoe, 1963).

The deprived child may be cognitively deficient because of limited home environment, little encouragement for language achievement, lack of opportunity for intellectual development, low self-esteem and self-confidence, and disadvantages related to sex.

1. Limited Home Environment

In the deprived child's environment, there is little opportunity to observe natural beauty--such as gardens with various flowers of different colors -- and other surroundings which will help him develop his aesthetic sense. He lives in overcrowded slums, in houses or apartments which offer a minimal range of visual stimulation. In his home, he has only a limited amount of objects, mostly functional. There is little in terms of pictures or other art work which will facilitate appreciation of shape, colors, figure-ground relationships. He has a few makeshift toys and none of the picture coloring, block building, and word games he will find in kindergarten. Paper and pencils may be scarce or completely lacking. He has little opportunity to learn the names of a variety of objects. Either there are not enough of them or most of the available ones are called "things."

The child is not given individualized training on how either to utilize touch or to manipulate different objects. He has limited opportunity to develop coordination and dexterity, to learn to grasp the visual properties of objects, and to exercise perceptual organization and discrimination. He is not able to sensitize himself and to perceive nuances in the environment which is what will be asked of him in classroom performance and in tests.

The home environment of the deprived child is not verbally oriented. For the most part, his home is a noisy place with much shouting, crying, and running. Very little of this noise is meaningful to the child, unless he is making the noise himself. He soon learns to cope with the noise by placing it in the background. The situation is ideal for him to learn to shut the environment off--to learn "inattention." (Deutsch, 1963).

Because of this inattention, the disadvantaged child misses a great deal of what is going on in his environment. The less the input of stimulation the less there is to remember and the less the opportunity to exercise memory. Deutsch (1963) pointed out that in the average family it was the adult who, by constantly sharing experiences with the child, linked the past and the present and trained the child to do the same;

to re-live experiences, and to link them to the present. The deprived child has limited opportunity to learn to use and develop his memory functions. He is deficient in time orientation; he seldom projects himself into the past or the future. His needs force him to be present oriented, to seek immediate gratification for them. Mobility within time sequences implies memory activity, a type of exercise which the environment of the deprived child does not facilitate (LeShan, 1952; Mischel, 1961).

From a practical point of view, the home environment does not help the deprived child develop what has been called "school know-how": He has not learned how to ask or answer questions; he certainly does not know how to study; he does not learn how to relate to people (a teacher) effectively; he is not practiced on quizzes; he has not been taught how to play with puzzles; he does not know how to take tests; and he lacks the fundamentals on how to learn (Deutsch, 1963).

2. Little Encouragement for Language Achievement

In order to learn language, we must be exposed to language. This presupposes opportunities to ask questions, to get adequate answers, and to satisfy curiosity. It presupposes identifying and naming objects, obtaining feedback, being corrected for errors, receiving reward and reinforcement for adequate responses, exposure to a great deal of verbal material, and of no less importance, having the opportunity to observe as well as to imitate the manner in which others use language (Deutsch, 1964a; Casler, 1961; Hess, 1964a; and Irwin, 1948). The adults in the home of the deprived child are generally much less effective in correcting pronunciation and grammar appropriate for the classroom. More often, aspects of language which do not communicate to the society at large,

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are reinforced.

The evidence available clearly indicates that the language symbolic process plays a highly important role at all levels of learning, specifically in the solution of problems and in the formation of concepts (Vigotsky, 1962). Cognitive efficiency is essential for the acquisition of the more abstract and integrative aspects of language (John 1963). Children differ in perceptual abilities as they enter school. Both middle and lower class children profit from training in these abilities, but children of lower classes profit the most in developing visual discrimination which plays a significant role in learning to read and consequently in the assimilation of many subjects (Covington, 1962).

Poor reading does not seem to be related so much to intelligence as it does to visual and auditory deficiences (Jensen, 1966; Hunt, 1964; Deutsch, 1963). There seems to be a close correlation between auditory discrimination and learning to read. Poor readers within any social class group have more difficulty in auditory discrimination than do good readers.

Lower class children experience significantly more difficulty in auditory discrimination than do children in higher classes. Poor readers in lower classes exhibit considerable more difficulty in shifting attention rapidly between auditory and visual stimuli (Raab, Deutsch, and Freedman, 1960; Katz and Deutsch, 1963).

It is perhaps in the area of language development that the deprived child has the greatest disadvantage. Middle class environment helps a child develop verbal fluency which, in turn, allows him to increase the range of the relationships he makes. He, thus, is able to relate and communicate better with others at different levels. He knows how to ask, how to act, and how to get from his teacher what he wants. In all these, the deprived child is seriously handicapped.

Does this mean, however, that the deprived child is non-verbal? Admitting that the greatest block to the realization of the deprived individual's creative potential may be his verbal inadequacies, Riessman (1962) warned that we must not conclude that the deprived child is non-verbal or less verbal than the middle class child. Eels (1951) has found, for example, that deprived children use a great many words with a fair amount of precision, but these are not the words which lead to success in the middle class school. Deutsch (1964b) found that in response to a word association test, young deprived children gave rich associations--although lacking in continuity. Their verbal impoverishment was most striking when they were presented with highly structured tasks, but they had greater and freer flow of language when the situation was unstructured and allowed for spontaneity. Significantly, he also found that their "receptive" linguistic ability was far superior to their "expressive" abilities. That is, they can understand far more language than they can speak. They seemed to be limited in the use of verbs but were much more effective in the use of descriptive adjectives.

Cortes (1963) found that culturally deprived Negro boys used fantasy very well in making stories in the Michigan Picture Test.

Taylor (1962) observed that in the word association test deprived children gave responses that were often less conventional, more unusual, original, and independent. They seemed to be more flexible and visual with languages. They were not restricted by verbal forms of communication but tended to permit language to interact more with non-verbal means of communication, such as gestures and pictures. As Taylor put it, they tended to "break through the language barrier, to be less word bound."

Still other research shows that in everyday usage, deprived individuals resort to language variations that are rich in simile and analogy, often influencing some elements in our culture--such as Beatniks (Murray, 1962). They are inclined to use informal language and mainly to convey concrete needs and immediate consequences, whereas middle class usage tends to emphasize the relating of concepts.

Thus, the basic problem of the deprived person does not appear to be lack of verbal capacity but of certain aspects of language usage and skills.

An important aspect related to language comprehension brought out by Deutsch (1963) concerned the correct anticipation of the sequence of language and thought. He pointed out that only 60 to 80 per cent of any sustained communication is actually assimilated. Knowledge of context and syntactical regularities of language make correct completion and comprehension possible. This completion occurs as a result of the correct anticipation of the sequence of language and thought. Consequently, the deprived child who has learned inattention, who is already deficient in auditory discrimination, and who has not acquired anticipatory language skills, is seriously handicapped in ability to understand the spoken word.

3. Lack of Opportunity for Intellectual Development

An early argument in the literature centered on the question of whether there were native differences in intellectual potential among the various cultural and ethnic groups.

Support for some native differences came from some early works (Bruce, 1940; McGurk, 1951; and Tanser, 1939). Klineberg (1963), however, criticized this research with regard to sampling procedure and as not giving sufficient consideration to all the relevant environmental factors involved.

Much more evidence became available to dispel the argument of native differences (Klineberg, 1935a and 1935b; Pasamanick, 1946; Lee, 1951; Anastasi and D'Angelo, 1952; Kirk, 1958; Carmichael, 1959; and Stallings, 1960). From all the accumulated knowledge, Klineberg (1963) rather definitely stated that there is no scientifically acceptable evidence for the view that Negro children differ in innate abilities from children in any other ethnic group. In fact, the evidence seemed to indicate that environmental influences are decisive in producing the so-called middle class IQ.

As the basic concern became clarified, the emphasis then turned to the investigation of developmental aspects in intelligence and the environmental forces which might influence them, more specifically, to determine those aspects in the environment which might be responsible for the deficits in intelligence observed in low socio-economic groups.

B. S. Bloom (1964) has summarized some of the salient research on developmental aspects of intelligence:

> Intelligence is a developing function; the stability of measured intelligence seems to increase with age.
>
> About 50 per cent of intelligence development takes place between conception and age four; about 30 per cent between ages four and eight, and about 20 per cent between ages eight and 17. As much intelligence development takes place in the first four years of life as in the next 13 years. Bloom commented that a single early measure of general intelligence was insufficient and could not be taken as a basis for a long term decision about an individual.
>
> There is little doubt that intellectual development is in part a function of the environment in which the individual lives. Extreme environments are significantly related to intellectual development; abundant environments will facilitate development, deprived environments will hinder it. The influences of extreme environments appear to be greatest in the early phases, which are also the more rapid periods of intelligence development and least in the later, less rapid periods of development.

The increasing research findings on the effect of deprivation on intellectual development seem to leave little doubt that the deficits observed in the lower class groups are not a function of inherent deficiencies but a function of the negative environmental forces which impinge upon them.

Jensen (1966) has shown that disadvantaged children who entered school with IQs and achievement quotients of 90 to 100 tested in the range of 70 to 85 by the time they entered high school. Between the first grade and high school there was a drop in IQ of about 20 points. This was explained in terms of "cumulative deficit," or what Jensen called more specifically "progressive achievement decrement." Deficiences built up as the child went up in grades. An important finding was that not all children who entered school with IQs in the lower half of the normal range (90 to 100) showed a decrement in IQ or achievement as they grew up. It was almost exclusively the children of low socio-economic status who showed this relative decline.

These findings apply to all culturally disadvantaged children, but several other studies show that this is particularly true of the Negro deprived child.

In both northern and southern areas, but particularly in the South, Negro pupils scored significantly lower in IQ tests (Carson and Rabin, 1960; Dreger and Miller, 1960; North, 1954; Osborne, 1960). They showed retardation in arithmetic reading skills and ability to handle abstract concepts (Bullock, 1950; Osborne, 1960). Yet, it has also been shown that children in deprived areas displayed particular types of skill in solving problems; that they were spontaneous and creative as well as quick and ingenious in adapting to situations which drew on these specified types of early conditioning (Riessman, 1962; Tyler, 1951).

They certainly do not behave like truly retarded children.

Why then do they score low on intelligence tests? Several reasons have been advanced.

One set of explanations is based on the interdependence of maturational and environmental factors. Piaget (1947) believed that a child's ability to learn was related to his prior experience. He postulated that prior experiences assisted in pre-determining the developmental stages of intellectual and cognitive achievements. Although the sequence in cognitive development may continue unaltered by experience, various cultural experiences and planned programs of education influenced the sequence of stages of intellectual development.

A somewhat similar explanation is based on the "cumulative hypothesis," previously mentioned. Jensen (1966) explained his rationale thus:

> All learning since the beginning of life depends upon previous learning. Knowledge and ability develop in a hierarchical fashion: the development of each new level is facilitated by transfer from earlier learning. More complex forms of learning build on simple forms of learning. When the habits, skills, or cognitive structures that are prerequisites for some new learnings have not been fully acquired, the capacity for new learning will be impaired, retarded, inefficient, incomplete, or even impossible depending upon the degree of inadequacy of prerequisite skills.

He concluded that since learning builds on learning, deficiencies in any one stage create still greater weakness in subsequent stages--thus creating a "cumulative deficit" which in turn brings about a progressive achievement decrement as the child moves up in grades.

Riessman (1962) differentiated between the "poor" learner and the "slow" learner. In our culture, we tend to believe that those who learn quickly are better learners than those who learn more slowly. "Slowness" is not seen as another style of learning with strengths of its own, but equated with "poorness." Because of this misunderstanding and the frustration and discouragement found in school, the slow learner may become a poor learner. Slow learning may be due to factors other than intellectual limitation--such as caution, need to be thorough, meticulous style, concentrated interest on a particular aspect, reading difficulty, even antagonism.

The applicability of IQ tests to deprived groups has been questioned by several investigators.

Davis (1948) questioned the fairness of giving tests heavily loaded with middle class problems and language to underprivileged children. In his research, he removed from the lists those words and problems in which deprived children had previously done poorly. He substituted words which were equally familiar to all children. Davis found that in spite of these substitutions deprived children did not show a marked improvement. There seemed to be other factors involved.

Haggard (1954) investigated some other variables: One was test-taking ability. His hypothesis was that deprived children lacked meaningful directed practice as well as motivation in a test-taking situation. He anticipated that because of lack of familiarity the child would feel distant and fearful of the examiner. With practice (about three hours) and proper motivation, the children's IQs improved significantly, even in the old tests in which no substitution of words had been made. He sensitized the examiners to the needs of the children and established a system of reward which proved highly successful in improving the attitudes of children and their performance in the tests.

Murray (1960) objected to the time factor built in intelligence tests. He contended that the brevity of the exercises and, particularly, the emphasis on speed worked against the slow and more deliberate style of the deprived child. He also pointed out that the IQ score did not consider the method of thinking used in arriving at an answer; only the accuracy of the final answer. Nor was it considered that IQ tests are built on experiences and vocabulary presumed to be normal for the culture and which it is assumed will increase with age. This tends to work against the deprived child who has not been exposed to these experiences and vocabulary. Items which do not increase with age--such as various skills--are not included in IQ tests, and these could be the very items in which a deprived child might excel.

The highly academic nature of the problem solving exercises built in intelligence tests has been discussed by R. W. Tyler, (1951). Present intelligence tests favor school activities and achievement but disregard specific abilities which the deprived child might exercise in resolving practical problems in their lives.

Another factor considered is that there seems to be more incidence of organic brain damage in Negro children. This would reflect inadequate prenatal care and nutrition in the homes as well as the higher incidence of prematurity (Pasamanick and Knobloch, 1958; Schwebel, 1965).

4. Low Self-Esteem and Self-Confidence

The Ausubels (1963) explained ego development as "the orderly series of changes in an individual's self-concept, self-attitudes, motives, aspirations, sources of self-esteem, and key personality traits affecting the realization of his aspirations as he advances in age in a particular cultural setting."

The cultural setting of the deprived child lacks the influences needed to enhance ego development, to foster the acquisition of a constructive perception of self. Perhaps to the contrary, the environmental influences in his early life will lead to the formation of personality properties which, in turn, will lead to stagnation in growth, to psychological degradation and injury to self-esteem.

Many of the negative influences which impinge on personality development in early childhood have been often and exclusively ascribed to minority racial groups rather than to the larger subcultural segment known as the lower class group. Yet, it has been shown that social class appears to be a far more potent variable than race in predicting environmental and attitudinal factors (Bloom, Whiteman, and Deutsch, 1963). Working with diverse racial groups--Puerto Ricans in New York, Negroes in the United States and Oriental Jews in Israel, Sophie Bloom (1960) arrived at similar conclusions: Although these groups were very different in origin, their difficulty in adjustment to society and in their children's adaptation to school seemed to be more related to cultural deprivation rather than to their ethnic background.

It would appear however that Negro children are even more disadvantaged, not only because of their deprived status, but also because they have been indiscriminately placed at the lower stratum of the lower class sub-culture (Ausubel, 1963a).

What are some of the environmental influences that are believed to contribute to inadequate ego development and low self-concept in the deprived child?

In the lower class, parents are less consistent, more casual, and prone to use harsh corporal punishment (Davis, 1943; Maccoby _et al_, 1954). Because of their limitations and concerns, these parents tended to provide less succorant care and supervision for their children (Havighurst and Taba, 1949). The role of the father was more punitive than loving and supporting. He tended to withdraw supervision early, leaving the children free to roam the neighborhood and to join in the activities of unsupervised groups (Markley, 1958). The role of the mother was often marked by excessive domination, punitiveness, suppressive controls, and harsh physical punishment. She tended to maintain considerable social and emotional distance between herself and the child, a condition believed responsible for the greater prevalence of the authoritarian personality syndrome observed in lower class children. They may tend to develop ambivalent attitudes toward authority figures and to hide these conflicts by assuming a false front of exaggerated compliance, or by withdrawing and responding, not to the person but to his authority attributes (Dickens and Hobart, 1959; Hart, 1957; Lipset, 1959).

Negro children living in a deprived area have added problems. Their families are often more unstable, lacking in male influence, matriarchal, and more authoritarian than comparable lower class white families (Conant, 1961; Hill, 1957). Early in their lives, approximately at age three, Negro children develop consciousness of self--particularly with regard to race consciousness (Stevenson and Stewart, 1958; Clark and Clark, 1939). Not yet five, they will sense that they are marked and grow uneasy (Goodman, 1952). They will become aware of the negative implication of skin color in relation to social status and personal worth (Stevenson and Stevenson, 1960). They will learn that skin color is important, that white is to be desired, dark to be regretted (Landreth and Johnson, 1953).

What are the results of these social pressures on the personality and self-image of the Negro culturally-disadvantaged child?

Having no apparent reasons for not accepting these deprecatory evaluations as being representative of him as a low-type person, he develops pervasive and deeply ingrained negative feelings about himself (Bernard, 1958). He learns to resist identification with his own stigmatized racial group and may prefer and seek the companionship of white playmates (Clark and Clark, 1947; Stevenson and Stewart, 1958). This early developed resistance to acknowledge his racial membership not only results in ego deflation but also creates a barrier toward parental identification, as well as reaping from such identification the derived status that universally constitutes the basis for self-esteem during childhood. His low self-esteem will be a barrier to his effective intellectual and social functioning in school (Goff, 1954; Deutsch, 1963). He will be unrealistically modest about his own ability (Wylie, 1963). He will become frustrated and maladjusted (Hollingshead and Redlich, 1958; Srole _et al_., 1962). His cumulative deficit will become insufferable as he goes up in grades (Jensen, 1966). By the time he gets to the fifth grade, he will tend to show a more negative self-evaluation than the white student (Keller, 1963). In total desperation, he will drop out of school (Coleman, 1960), and/or develop personality disorders (Ausubel, 1952), and/or express his deep frustration and hostility by transgressing the law (Srole _et al_., 1962). This is not necessarily the case when adequate school programs are introduced and the needs of these children are met (Schreiber, 1964b).

The plight of the Negro deprived child is best summarized by Ausubel (1963a):

> The consequences of this regrettable state of affairs for Negro children's self-esteem and self-confidence, for their educational and vocational aspirations, and for their character structure, interpersonal relations, and personality adjustment, constitute the characteristic features of their ego development.

5. Disadvantages Related to Sex

An unusual aspect in the deprived environment of the Negro child is that while it tends to foster the personal growth and self-perception of the girl, it hinders rather severely the ego development of the boy. Several reasons are offered to explain this preferential practice. For the most part, Negro children are reared in a matriarchal family atmosphere where girls are openly preferred by the dominating female sex. The male sex role is usually secondary and not respected. If the adult male parent does not desert his family--as is often the case--his lack of preparation prevents him from becoming a reliable provider for the family economic needs. The mother becomes the only dependable source of identification for the child--favoring, of course, the girl. Even in the wider culture, the Negro girl has far more chances of gaining status and realizing her aspirations than the Negro boy (Day, 1949; Deutsch, et al., 1956).

As a result, Negro girls show more mature and realistic aspirations than do Negro boys and assume more responsible roles. They have higher achievement motivation and perform better than boys, not only in language skills but in all other academic subjects as well (Deutsch, 1956; Gaier and Wambach, 1960). Far more Negro girls than boys complete high school education (Smuts, 1957).

One long sustained misconception about parents and children in deprived areas is that they are not interested or concerned with education. There is much evidence to show that they have a much more positive attitude toward education than is generally believed. They value education, but they are alienated from the school and tend to resent the teachers (Riessman, 1963). In one of his studies, Clark (1963) conducted a survey of parents in a deprived area. One of the questions asked was "what did you miss most in life that you would like your children to have?" Over 70 per cent answered "education."

In another preliminary study, Clark (1963) investigated the attitudes of teachers in ten public schools located in depressed areas of a large northern city. He found that:

> The overwhelming majority of the teachers studied considered their children as intellectually inferior and therefore not capable of learning.
>
> They repeatedly expressed and appeared to believe that it was not possible to teach these children. In support of their conclusions, they offered the belief that these children could not learn because of "poor heredity", "poor home background," "cultural deprivation," and "low IQ." With a few exceptions of individual principals and teachers who seemed to respect the human dignity and potentialities of their students, most teachers showed a pervasive negative attitude toward these pupils and considered them inherently inferior.

The work of Davis (1948) has been concerned with the relationship between social class membership and the learning situation. There is increasing interest in learning about the problems involved in situations where middle class teachers instruct students of all economic class groups. It seems important to know, for example, not only the particular attitudinal patterns which the teacher communicates to working class children, but also the particular ways in which she communicates her attitudes and how these block or facilitate the academic motivation of these children (Clark, 1963).

Pertinent here are the comments of Watson (1962), who feels that above anything schools can offer, the starting point must be respect for the student. Nothing else that educators have to give will help very much if it is offered with resentful, contemptuous, or patronizing attitudes.

It is important to realize that overgeneralization may overshadow the facts presented in this brief review of influences impinging upon the development of the culturally deprived child. Common factors in cultural conditioning may obviously induce many similarities in personality development and uniformities in behavioral manifestations. It cannot be said, however, that all lower class or deprived children will display the same characteristics to a similar degree. Differences in temperamental and cognitive predispositions as well as differential experiences in the home and in the overall cultural milieu may account for many unique, individual variations. Being aware of the many negative influences to which these children are exposed may help us to expect the possibility that, as a consequence, some of these behavioral characteristics may develop but certainly not to predict that they will.

Importance of Pre-School Training

Educators today are deeply concerned with all the aspects that affect the child whom they are trying to educate. It is no longer feasible to say that the social environment of the child is not the problem of the educator, that it belongs to welfare agencies or, in general, to society. It belongs to everyone but, most of all, to the educator. The educator is not a personnel manager, or an administrator, or an organization man, although his work involves organizing, managing, and administering. He is a social and intellectual leader, and he begins to exercise his leadership when he recognizes the conditions of his society and brings to bear upon its members the force of a humanitarian philosophy (Taylor, 1961).

MacIver (1962) has stated:

> The school function is to educate and where the family and the community fail to provide the social adjustment and the psychological development necessary to prepare the young to receive the education the school offers, it must step in to provide it within the area of its capacity. The school is in a peculiarly strategic position to perform such preventive and rehabilitative function.

Besides the basic issue of respect of human rights and human dignity is the added problem of urgency. There are hundreds of thousands of children who are not acquiring the level of literacy and potential needed to function adequately in a society increasingly dependent on technology and on reading skills. The relationship of cultural deprivation with failure in school, with school drop-out, and with delinquency is no longer considered coincidental.

The empirical evidence reviewed in this report clearly shows that the culturally deprived child comes into the school situation not only unprepared to succeed but, more frightening, thoroughly prepared to fail. Fortunately, the teacher's, the parent's, and the community's cry that something be done is no longer a mere hope. Something is being done.

Compensatory Education Programs for the Deprived Child

The emerging interest in the educational problems besieging the disadvantaged child is evidenced by the increasing concern of the Federal Government and the many educational programs as well as research studies which have been initiated since 1960. Reports of Project Head Start and pre-school compensatory programs from all over the nation are rapidly expanding (U.S. Bulletin #17; Gray and Klaus, 1965; Gray et al., 1965; Gaebler, 1966; Hall, 1966; Larson and Olson, 1963).

Although different approaches are being used, the programs are usually geared to involve the child, the parents, and the community. It is most interesting that the findings in these reports lend considerable support to the empirical evidence already gathered.

1. Instruction of the Child

Compensatory intervention seems to work best if introduced early in the life of the child--rather definitely in the pre-school years (Jensen, 1966). The deprived child has the potential for learning. He may have unique ways of learning. His rate may appear slow, probably because of motivational factors and overall lack of familiarity with school demands. He has more language ability than previously thought.

It will show best if he is allowed to speak on subjects that interest him and to use his own means of expression: he is ingenious and creative if allowed to express this potential in his own way. He can be brought into the academic mainstream, but special techniques are needed to help him get there (Cummings, 1963).

Dobbin (1966) reported some interesting generalizations from a nationwide study on Project Head Start.

a. For the deprived child, the teaching-learning process must be an intensely personal thing; human interaction is an indispensable ingredient, _i.e._, the need for smaller classes, teacher's aids, and other persons to facilitate this close interaction.

b. The teaching process of these children must be shared widely with parents and with the community, _i.e._, activities and trips to a variety of interesting places to provide a wide range of experiences.

c. Love, although necessary, is not enough. School personnel must learn as much as possible about the developmental characteristics of children and about the learning processes at this early age.

d. With these young children, learning by doing is not just a catchy phrase--it is a stark reality of life. Without exception where children were active and involved and doing things that were interesting to them, they were learning and changing in desired ways.

e. Best results were obtained when the methods for encouraging and reinforcing the overall development of the child were based on: (1) child development orientation rather than on subject matter or societal demand orientation, (2) actively involving the child on tasks of interest to him, (3) on accepting the child "as is" rather than creating artificial and threatening environments, and (4) the recognition that there are critical developmental stages in intellectual growth through which children go and the need to adapt school methods and procedures to these developmental stages.

f. One of the universally overlooked materials of instruction is "food", _i.e._, using edibles not just to feed but as valuable sources of instructional material. The author comments "... learning materials that can be studied and then _eaten_ appear to have an appeal that educators should no longer neglect."

g. The most important consequence of Project Head Start will be

> reflected in what happens to these particular youngsters when they enroll in the regular kindergarten and first grade classes of their community, *i.e.*, the need of the school to build on the experiences that these children received in a Head Start program by introducing innovative practices in the regular school which will insure that these gains are not lost.

2. Involvement of the Parents

Whereas the efforts of the schools and allied school organizations have been rather successful in involving the parents from higher economic groups in the education process, these same efforts have failed so completely with parents of the disadvantaged child that in most cases these efforts have been abandoned altogether. This failure has led to the generalized belief that parents in low income families are not interested in their children's education. A new look has evolved from the various program reports to help dispel this belief. New approaches to the problem have met with marked success. It has been found that special projects which enlist the help of the mothers have a greater appeal than just attending general meetings. It has been recognized that it is difficult for working mothers to come to school for conferences. For the most part, these mothers have several children and cannot afford babysitters. Special arrangements for social workers to meet and consult with them at home or to make cooperative arrangements for the care of the children at home have brought a considerable number of parents into the life of the school (Cummings, 1963).

3. Participation by the Community

The community must face its own responsibilities if the plight of the deprived person is ever to be resolved. There is a limit to what the school alone can accomplish in helping children from disadvantaged families find the place in society to which they are entitled by their abilities and energies. There are many problems in our society which the school cannot resolve. When the school has reached the limit of its services, the community must take over. The most favorable approach is for school and community to work on the problems together and at the same time (Cummings, 1963).

Evaluation of Compensatory Programs

For the most part, compensatory programs report that children from deprived homes who were exposed to these experiences gained significantly in IQ, in basic social skills, and in attitudes toward school. One program in which the Illinois Test of Psycholinguistic Abilities was used indicated significant differences in all of the scales (except motor encoding) and an increase of eight months in language age as a result of the training (Gray, 1965).

A study of Weaver (1963) with culturally deprived children in a pre-school reports somewhat similar gains.

Few would doubt by now the value that this compensatory intervention has in the life of the deprived child. However, a persistent issue touches upon the stability of the gains made. Do children retain the gains made during Head Start and Pre-School program participation? Does this type of training have any relevance to learning in the higher grades?

The hypothesis that the overall development and later learning of a deprived child can be enhanced by enriching pre-school experience is based on sound theoretical formulations, but it will remain hypothetical until more empirical evidence is obtained. The majority of these programs are relatively new and the evidence will come as these programs are evaluated longitudinally.

The evaluation of these programs, however, present many theoretical and practical problems. There are already several reports evaluating nursery enrichment programs which generally show minimal effect on later grade-school performance (Weikart et al., 1964; Alpern, 1965).

These negative findings may well reflect the nature of the intervention program as well as the type of study performed.

Goldberg (1966) discussed some significant points in this respect. The programs may have too little or too much structure; they may have focused on experiences not sufficiently relevant to school demands; the programs may not have sufficient experiences; or the intervention may have started too late. The teacher's training and ability may be an important factor.

Evaluative research in some of these programs is often an afterthought. It is not built in the initial planning of the program, and when assessment is needed, consultants are called in but after the program is already in full swing. Generally, very little information has been collected on the children before they started the program--as physiological condition and social adaptability. Even some test information may not be available against which to contrast future gains.

Most programs use control groups which are inadequate and many use no controls at all. In some cases, the number of children in the program is so small and the data available too meager to make comparative analysis of the results. The factor of possible sex differences at this early age is often completely ignored.

Goldberg (1966) pleads for a longitudinal approach in this type of evaluative research:

> If the end goal implicit in the present Head Start movement--for such it has become--is improved intellectual and academic functioning, the formal evaluation must wait at least until the end of second grade at which point academic performance becomes reliably predictive of later school achievement. Studies must, therefore, be longitudinal, covering a span of at least four years.

In designing the evaluative study on the Child Development Program of the Cleveland Public Schools, the investigators have attempted to take all these important suggestions into consideration.

SECTION III

GENERAL PROCEDURES

The main purpose of this study was to assess the impact of the Cleveland School Board's Child Development Program (CDP) on various areas of cognitive functions of children exposed to the program. The investigators also conducted a secondary experiment to see what effect, if any, specific training would have on perceptual development. This training was given to a sub-sample of children in the CDP.

Procedures for Evaluating the Child Development Program

Test Design

A pre-post test design with each child as his own control was used. Two treatment groups and one control group were contrasted for gains. Here treatment is defined as ten weeks' exposure to the CDP. The loss of subjects between testing due to transiency and illness was surprisingly small.

> Between February 4 and April 6, 1966, 107 children were administered the Stanford-Binet Intelligence Scale and the Illinois Test of Psycholinguistic Ability (ITPA).
>
> Between April 19 and June 6, 1966, 100 children of the original sample were readministered the Stanford-Binet and 93 children the ITPA.

Every effort was made to hold the pre-post testing interval constant at 10 weeks. Since this was not always possible to do, it became necessary to test statistically to see if group differences existed for time between tests (See Sec. IV, p. 52).

Total Sample

Three groups of Negro and white pre-school children from high risk poverty areas were selected. All of the children involved in the study fell within the age range 4 years 0 months to 4 years 11 months when testing began.

The children of two of the groups--the experimental groups--had either just entered the CDP or had been active in it since September, 1965. The first experimental group came from Willow School Developmental Center (Willow Center). It was composed of white children, largely of Southern migrant background. The second experimental group was taken from the Margaret A. Ireland School Developmental Center (Ireland Center). It was composed of Negro children.

The children in the third group--the control--were from four day-care nurseries which had been established largely as a service to working mothers. The nurseries were chosen for their proximities to the centers from which the experimental groups came.

The West Side Community Center (West Side Nursery) and the Merrick House Settlement and Day Nursery (Merrick Nursery) contributed white children. There was a tendency for these children to come from higher socio-economic brackets even though the nurseries were situated in areas similar to that of the Willow Center. People (occasionally professionals) who lived outside the area but worked in the neighborhood were using these services for their children. The same was true of Crawford Road Nursery (Crawford Nursery). League Park Center (League Nursery), however tended to draw children equivalent in socio-economic background to that of Ireland Center. The control group then appeared to be an ethnically integrated group with a tendency toward a middle class economic status. By choosing children as controls who were involved in nursery programs, it was hoped that the positive effects of simple organized social experience and adult contact (i.e., in general, the Hawthorne effect) would be controlled.

For reasons of economy, the sampling procedure followed a nonprobability, judgemental approach, i.e., entire classrooms were taken intact on the assumption that they would be representative of the population of pre-school age children in poverty areas.

Table 1 presents the final sample breakdown.

TABLE 1

BREAKDOWN OF FINAL USABLE SAMPLE

		Boys	Girls	Totals
Treatment Groups	Willow Center	13	19	32
	Ireland Center	15	18	33
	Sub-Total	28	37	65
Control Group	Merrick House Nursery	8	4	12
	West Side Nursery	1	3	4
	League Nursery	4	3	7
	Crawford Nursery	8	6	14
	Sub-Total	21	16	37
	Grand Total	49	53	102

Treatment Variable

A minimum of 40 year-round Child Development Centers have been established by the Cleveland Public Schools with the help of Federal funds provided by the Elementary and Secondary Education Act of 1965 and the Economic Opportunity Act. During the 1965-66 school year, 1,700 children attended either a morning or afternoon session, Tuesday through Friday.

Objectives guiding program development in these Centers are outlined in The Pre-Kindergarten Teacher's Guide (Cleveland Public Schools, 1966):

> To acquaint the child with school as a pleasant place.
>
> To develop and increase the child's self-esteem.
>
> To involve children in a wide range of experiences beyond their normal environment.
>
> To help children to use language effectively to increase readiness for school experiences.
>
> To identify and refer health problems prior to kindergarten.
>
> To help parents to increase their competence in preparing children for school.
>
> To improve the child's mental processes.
>
> To help children and their families to improve health and nutrition practices.

Nearly all the teachers have had experience in Project Head Start, pre-school, and child development programs. They are aided by teacher assistants, student aids, and volunteers who are especially helpful when the class divides into small activity groups. Supporting the teaching team are medical, dental, speech, psychological, social work, and parent education services.

Classrooms are arranged to meet the needs of the children, not the teachers' convenience. There is a large, open space for freedom of movement, block play, major physical activities, games, and rhythms. There are areas in each classroom where various materials and equipment are kept on open shelves for the children's use. School authorities anticipate that the informal, accepting, friendly atmosphere of the classroom will help the young child develop positive attitudes toward school and to the adults and children with whom he comes in contact.

The educational program is devised to meet the needs of children in every area of their development: Physical, intellectual, social, and emotional.

> Impoverished children are believed to achieve more through physical-motor channels than through the verbal-cognitive ones. Activities include those giving first hand sensory experiences, dramatization and role playing, audio-visual aids, learning by doing, opportunities for developing muscular coordination, etc.
>
> The children themselves choose some activities--such as housekeeping, dramatic play, water, woodwork, sand, table toys, and active play. This helps them to develop initiative and independence, accept responsibility for the choice, practice needed skills in language, establish one-to-one relationships, and express individual interests.
>
> To promote auditory development and speech improvement, teachers emphasize awareness of sound, discrimination between different sounds, and the importance of purposeful listening.
>
> Visual stimuli are systematically introduced in a way that is appropriate to the level of development of each child.
>
> All aids helping children to develop the ability to form clear concepts are given priority. Children are exposed to smelling, tasting, and tactual experiences. Through understanding relationships, the concepts of number, time, shape, size, and color are experienced as parts of daily work-play projects.
>
> Music is important for enjoyment in young children. It serves as a spontaneous creative play response, a form of

> emotional physical release, and an unlimited avenue of self-expression through rhythmic interpretation. Music is especially important as an outlet for the shy non-verbal or non-English speaking child. It provides the incentive to express himself in a group.
>
> Creative activities for the child include drawing, brush painting, sponge painting, block building, and woodworking.
>
> Social science activities are planned to develop confidence in the child as a person with individual likes and dislikes through first-hand experiences with the bigger world of his school, neighborhood, and community. Resource people from the community visit the classroom or the children take enrichment trips outside the classroom.
>
> Science activities lay a foundation on which the child can build in years to come rather than to impart detailed, factual information. These areas of experience include animals, plants, sun and light, reflection, magnifying glass, earth, water, rain, snow, wind, air pressure, temperature, balance, wheels, weights, levers, magnets, and electricity. (See The Pre-Kindergarten Teacher's Guide, 1966).

The Cleveland Public Schools' CDP believes establishment of a positive self-concept is more important than academic achievement for children not yet motivated toward a school program. The pre-kindergarten offers many experiences to build positive concepts so that chances of success in school will be enhanced.

Teachers also attempt to involve parents in the pre-kindergarten activities of their children. They seek parent-school relationships based upon respect and honest concern. Teachers, through recognition of the realistic needs of parents, attempt to develop a cooperative bridge of understanding between the home and the school.

Scales

1. The Stanford-Binet Intelligence Scale

The Stanford-Binet was chosen for two general reasons. First, since this study is the first step in a longitudinal program, the Stanford-Binet is one of the few scales about which enough reliability data are available and where at least one major factor remains the same at various age levels to allow for meaningful comparisons at the various steps. Secondly, a measure of global or general intelligence was desired to facilitate matching where necessary and also to use as a base of general cognitive functioning against which to contrast other, more specific areas of cognitive function.

2. The Illinois Test of Psycholinguistic Ability (ITPA)

The ITPA is a diagnostic test designed to detect specific abilities and disabilities within the child's general language performance so that an educational or remedial program can be initiated. It is a general test made up of nine specific sub-tests all producing their own scores. Since the literature points to difficulty in verbal behavior as an important variable for understanding problems of the culturally deprived, this test seemed most relevant (see Sec. II, p. 8). The battery consists of the following sub-scales.

Tests at the Representational Level

Tests at this level have one thing in common. They all assess some aspect of the subject's ability to deal with meaningful symbols--to understand the meaning of symbols (decoding), to express meaningful ideas in symbols (encoding), or to relate symbols on a meaningful basis (association).

The Decoding Tests. Decoding is the ability to comprehend auditory and visual symbols--*i.e.*, the ability to comprehend spoken words, written words, or pictures.

Test 1. Auditory Decoding is the ability to comprehend the spoken word. It is assessed by a controlled vocabulary test in which the subject is asked to answer yes or no by voice or gesture to a series of graded questions.

Test 2. Visual Decoding is the ability to comprehend pictures and written words. It is assessed by a picture identification technique in which the subject selects from among pictures in a set the one which is most nearly identical, on a meaningful basis, to a previously exposed stimulus picture.

The Association Tests. Association is the ability to relate visual or auditory symbols (which stand for ideas) in a meaningful way.

Test 3. Auditory-Vocal Association is the ability to relate spoken words in a meaningful way. This ability is tested with the familiar analogies test in which the subject must complete a statement by supplying an analogous word (*e.g.*, the examiner says, SOUP IS HOT; ICE CREAM IS____).

Test 4. Visual-Motor Association is the ability to relate meaningful visual symbols. The test requires the subject to select from among pictures in a set the one which most meaningfully relates to a given stimulus picture.

The Encoding Tests. Encoding is the ability to put ideas into words or gestures.

Test 5. Vocal Encoding is the ability to express one's ideas in spoken words. It is assessed by asking the subject to describe simple objects such as a block or ball.

Test 6. Motor Encoding is the ability to express one's ideas in gestures. The manual language of the deaf is an example of motor encoding. This ability is tested by showing the subject an object and asking him to supply the motion appropriate for manipulating it (e.g., drinking from a cup or strumming a guitar).

Tests at the Automatic-Sequential Level

Tests at this level deal with the non-meaningful uses of symbols, principally their long term retention and the short term memory of symbol sequences.

Unlike the representational level tests, no attempt has been made to divide further the Automatic-Sequential level tests into their decoding, association, and encoding aspects because of the lack of theoretical clarity at this level.

The Automatic Tests. Our frequent use of a language and the abundant redundancies of language lead to highly overlearned or automatic habits for handling its syntactical and inflectional aspects without conscious effort. So familiar are we with linguistic structure that we come to expect or predict the grammatical structure of what will be said or read from what has already been seen or heard. In speaking or writing, these automatic habits permit one to give conscious attention to the content of a message, while the words with which to express that message seem to come automatically.

Test 7. Auditory-Vocal Automatic ability permits one to predict future linguistic events from past experiences. It is called "automatic" because it is usually done without conscious effort. In listening to a speech, for example, we develop an expectation for what will be said which is based on what has already been said. In this test, the subject must apply the last word in a test statement, invariably a word requiring inflection (e.g., the examiner says, FATHER IS OPENING THE CAN. NOW THE CAN HAS BEEN ____________).

No suitable visual-motor counterpart to this test could be designed. The ability to read incomplete sentences and supply the correctly inflected word in writing would seem an appropriate task, but obviously it is not suited for two-and-a-half year old children. After many unsuccessful attempts to design a picture substitute for the visual-motor channel, the effort was abandoned.

The Sequencing Tests. Sequencing, as used here, is the ability to correctly reproduce a sequence of symbols; it is largely dependent upon visual and/or auditory memory.

Test 8. Auditory-Vocal Sequencing is the ability to correctly repeat a sequence of symbols previously heard. It is assessed by a modified digit repetition test.

Test 9. Visual-Motor Sequencing is the ability to correctly reproduce a sequence of symbols previously seen. It is tested by requiring the subject to duplicate the order of a sequence of pictures or geometrical designs presented to the subject and then removed.

Data Analysis

The data analysis involved two parts: The analysis of scale intercorrelations and the analysis of group differences.

1. Analysis of Scale Intercorrelations

The intercorrelations between the 24 sets of scores (pre-test and pre-post difference scores) were computed on an IBM 1620 processing system. By doing this, it was possible to see not only what scales tended to go with, or be affected by, what other scales but also what areas of cognitive growth tended to be influenced by other areas of cognitive growth.

2. Analysis of Group Differences

Here pre-post differences (post-score minus pre-score) were analyzed. For the Stanford-Binet and all scales of the ITPA, a 3x2 factorial analysis of variance (ANOVA) was employed to analyze mean differences found among the contrast groups listed in Table 2.

TABLE 2

GROUP SAMPLE SIZE BREAKDOWN ANALYZED BY ANOVA
FOR STANFORD-BINET AND ITPA SCALES

Treatment Sex	Willow Center	Ireland Center	Control	
Boys	13	13	13	39
Girls	13	13	13	39
Total	26	26	26	78

Because of the way the data were collected, the six groups had to be balanced (*i.e.*, made equal in size) *post facto*, resulting in the loss of some data. Thirteen children per group, or a total of 78 children, were used in this part of the analysis. Where cells were larger than 13, data were randomly deleted.

Evaluation of the Frostig Program for the Development of Visual Perception

Test Design

Experimental and control sub-groups of children were contrasted for change as a result of special training given one hour a day for 15 school days. With the cooperation of four psychologists, 45 children in these sub-groups were given the Marianne Frostig Developmental Test of Visual Perception (Frostig Test) prior to the beginning of the program and again after its completion. A pre-post test design with each child as his own control was used.

Total Sample

Three groups of 15 children each were used for this portion of the study: 1. An experimental group was randomly selected from the Willow Center. It was then given the Frostig Program for the Development of Visual Perception (Frostig Program). 2. A control group represented those children who remained at Willow but were not involved in the Frostig Program. 3. A second control group was made up of children from Merrick Nursery and West Side Nursery who were not involved in the CDP or Frostig program. Because of the limited number, the sex variable was not controlled, although there was almost an equal number of boys and girls in each group.

Treatment Variable

A training program was initiated in which the experimental sub-group was exposed to the treatment and procedures outlined in the Frostig program for one hour a day for 15 school days. The control sub-group received no such training. The program was begun May 11, 1966, and ended June 3, 1966.

A separate well equipped classroom was provided by the principal of the school.

The training program was conducted by a teacher with many years of experience with pre-school children. Daily preparation was required for her to carry on each session. A volunteer assistant was present during the training sessions in order to observe and take notes of the procedures.

The first 15 exercises for each one of the five areas of perceptual training provided by the Frostig program were selected. These five areas are defined by Frostig (1964) as follows:

1. Perception of Position in Space

Normal development in this area helps to differentiate letters that have the same form but differ in position--such as b and d--and also helps in the ability to recognize like sequence of letters in a word and the sequence of words in a sentence.

2. Perception of Spatial Relationships

This area is also significant in the above functions.

3. Perceptual Constancy

Adequate perception of constancy of shape and size is essential if a child is to be able to recognize words he knows when they are seen in an unfamiliar context, color, size, or style of print.

4. Visual Motor Coordination

This area is important because well-directed eye movements are a prerequisite for reading and for most other school work. Good coordination of hand and eye is necessary for writing.

5. Figure-Ground

The ability to distinguish figure from ground is necessary for the analysis and synthesis of words, phrases, and paragraphs, without which, it is impossible to learn to read. This ability is also indispensable for locating information in a certain place on a page, such as in a table of contents or a dictionary.

The first day of training the children were given exercise No. 1 for each of the five areas. The second day they were given exercise No. 2 for each of the areas, etc.

Throughout the entire program each paper-and-pencil exercise was pre-empted by motoric activities relevant to the particular area. These activities are not only suggested by the Frostig program but by several other investigators who emphasized the importance of all-body motor development and hand-eye coordination in working with the deprived child.

The teacher displayed considerable ingenuity in devising a number of appropriate and interesting physical activities using furniture, blackboard, and many other objects.

Random selection resulted in some significant individual differences in overall ability within the group. From the very first session, it became evident that some children were able to finish the exercises with little or no difficulty but others experienced considerable trouble. To insure some level of mastery and profit from the training, those children who experienced difficulty were kept in the room after the rest had returned to their classroom; they were given further practice until they could complete the exercises with a fair degree of facility.

The day after the completion of the program, the experimental and control sub-groups were again tested.

Frostig Scale

The Frostig Test is a diagnostic test much like the ITPA only dealing with visual perception exclusively. The specific sub-tests were chosen because of their apparent relevance to performance during the preschool and early school years. The four relevant sub-tests included:

1. Eye-Motor Coordination

This test of eye-hand coordination calls for the drawing of continuous straight, curved, or angled lines between boundaries of various widths or from point to point without guide lines.

2. Figure-Ground Discrimination

This test involves shifts in perception of figures against increasingly complex grounds. Intersecting and "hidden" geometric forms are used.

3. Constancy of Shape

This test concerns the recognition of certain geometric figures presented in a variety of sizes, shadings, textures, and positions in space, and their discrimination from similar geometric figures. Circles, squares, rectangles, ellipses, and parallelograms are used.

4. Position in Space

This test requires discrimination of reversals and rotations of figures presented in series. Schematic drawings representing common objects are used.

In following the revised procedure for pre-school children as suggested in the Frostig Program, it was observed that many of the children in the sample had no difficulty in accurately completing the tasks--thereby preventing a pre-post comparison. Therefore only the average or mean perceptual age was considered reliable enough to analyze statistically.

Data Analysis

The Frostig experiment was analyzed by a simple f-test. The groups contrasted and their sample size are found in Table 3.

TABLE 3

GROUP SAMPLE SIZE BREAKDOWN FOR ANOVA EVALUATION OF FROSTIG

Willow Center With Remediation	Willow Center Without Remediation	Control Without Remediation
15	15	15

SECTION IV

RESULTS

This section describes the basic statistical relationships among the various scales of cognitive function used in this study as well as the statistical analysis of mean differences on these scales for the groups which were compared. The scale intercorrelations tell how doing well on one scale influenced doing well on other scales. The analysis of group mean differences indicates whether sex difference and/or exposure to the CDP affects gain on these scales.

For general information, Table 4 presents the means and standard deviations for each task for all subjects on pre-test scores. This describes how all the children stood, on the average, when they began the program as well as how widely individual scores deviated from this average. The average chronological age of the children tested was about 54 months. On most of the tests, the average pre-test level of functioning for the entire sample was above the average total sample chronological age. Notable exceptions were the ITPA tests involving a vocal aspect.

Table 5 does the same for pre-post test difference scores. This table shows the extent to which growth took place, on the average, over the 75 days of the program. On all but some of the Frostig subtest scales, considerable positive growth was indicated.

TABLE 4

MEANS AND STANDARD DEVIATIONS IN MONTHS ACROSS THE ENTIRE SAMPLE FOR ALL SCALES USED FOR PRE-TEST SCORES

Scale	Mean in Months	Standard Deviation in Months	Sample Size Per Scale
Stanford-Binet MA	54.87	6.61	100
ITPA Total Language Age	54.86	9.14	93
ITPA Sub-Scales			
1. Auditory Decoding	54.88	1.22	93
2. Visual Decoding	58.61	1.74	93
3. Auditory-Vocal Association	49.70	1.16	93
4. Visual-Motor Association	60.17	2.15	93
5. Vocal Encoding	48.34	1.30	93
6. Motor Encoding	59.61	2.01	93
7. Auditory-Vocal Automatic	44.54	1.52	93
8. Auditory-Vocal Sequencing	58.45	1.58	93
9. Visual-Motor Sequencing	56.16	1.22	92
Frostig Mean Perceptual Age	48.47	1.11	45
Frostig Sub-Scales			
Eye-Motor Coordination	53.32	1.25	44
Figure Ground	43.25	.78	44
Form Constancy	46.45	2.83	44
Position in Space	50.44	1.28	43

TABLE 5

MEANS AND STANDARD DEVIATIONS IN MONTHS ACROSS THE ENTIRE SAMPLE FOR ALL SCALES USED FOR DEVIATION SCORES

Scale	Mean in Months	Standard Deviation in Months	Sample Size Per Scale
Stanford-Binet MA	5.11*	.39	99
ITPA Total Language Age	5.10	.46	92
ITPA Sub-Scales			
1. Auditory Decoding	3.14	1.15	92
2. Visual Decoding	6.92	1.77	92
3. Auditory-Vocal Association	5.66	.72	92
4. Visual-Motor Association	6.66	2.02	92
5. Vocal Encoding	5.16	1.10	92
6. Motor Encoding	6.83	1.49	92
7. Auditory-Vocal Automatic	6.84	1.16	92
8. Auditory-Vocal Sequencing	5.16	.86	92
9. Visual-Motor Sequencing	3.01	1.03	92
Frostig Mean Perceptual Age	4.43	.88	46
Frostig Sub-Scales			
Eye-Motor Coordination	1.04	1.17	45
Figure Ground	.33	.92	45
Form Constancy	13.53	2.73	45
Position in Space	4.67	1.56	42

*To see how much growth took place beyond expected for the 75 days between pre- and post-testing, 2.5 months can be subtracted from each of these means.

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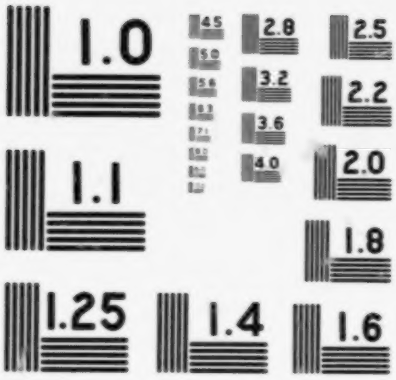
1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
5.6

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963

Scale Intercorrelations

Scale intercorrelations are vital in determining not only the utility of the measuring instruments but also in helping to explain actual differences found among groups on the various scales. It was hoped, for example, that the ITPA or Frostig sub-scales would correlate higher with their respective total scores than among each other or with sub-scales or total scores of other instruments. This would tend to illustrate that separate functions are being measured. Inspection of the intercorrelations based on pre-test scores for the entire sample (Table 6) indicates that for this sample, the scales are generally tapping independent cognitive functions.

As expected, the greatest influence on other scales was level of performance on the Stanford-Binet. In other words, good performance on the Stanford-Binet tended to coincide with good language development, especially the ability to relate spoken words in a meaningful way (Auditory-Vocal Association .60). Stanford-Binet performance does not seem related to the ability of these children to select from a set of pictures the one which most meaningfully related to a given stimulus picture (Visual-Motor Association .21). Consistent with this, Stanford-Binet performance does not appear to be significantly related to any of the various perceptual tasks of the Frostig.

With one exception all of the ITPA sub-tests appeared independent of one another for this sample. The exception is the Auditory-Vocal Association scale which at this level appears to be tapping the same function as the Auditory-Vocal Automatic scale (.58).

The pre-post test difference score intercorrelations (Table 7) tends to support the above finding that the scales were reasonably pure

TABLE 6

COMBINED GROUP INTERCORRELATIONS BETWEEN ALL SCALES AND SUB-SCALES FOR PRE-TEST SCORES

		Stanford-Binet M.A.	ITPA Total Language Age	1. Auditory Decoding	2. Visual Decoding	3. Auditory-Vocal Association	4. Visual-Motor Association	5. Vocal Encoding	6. Motor Encoding	7. Auditory-Vocal Automatic	8. Auditory-Vocal Sequencing	9. Visual-Motor Sequencing*	Frostig Mean Perceptual Age	Eye-Motor Coordination	Figure Ground	Form Constancy	Position in Space
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Stanford-Binet Mental Age	1		.63	.44	.31	.60	.21	.51	.39	.50	.53	.38	.53	.49	.37	.32	.52
ITPA Total Language Age	2			.50	.49	.65	.45	.63	.49	.66	.50	.61	.35	.46	.41	.30	.41
1. Auditory Decoding	3				.10	.41	.07	.37	.22	.37	.28	.20	.26	.18	.20	.27	.13
2. Visual Decoding	4					.15	.39	.25	.43	.29	.20	.30	.39	.42	.44	.27	.10
3. Auditory-Vocal Association	5						.15	.41	.13	.58	.23	.42	.21	.30	.20	.14	.22
4. Visual-Motor Association	6							.16	.43	.32	.15	.33	.13	.12	.19	.06	.24
5. Vocal Encoding	7								.38	.42	.41	.26	.29	.31	.24	.34	.12
6. Motor Encoding	8									.37	.17	.30	.20	.28	.29	.09	.23
7. Auditory-Vocal Automatic	9										.22	.45	.16	.25	.26	.14	.09
8. Auditory-Vocal Sequencing	10											.18	.70	.65	.28	.42	.62
9. Visual-Motor Sequencing	11												.37	.50	.26	.17	.38
Frostig Mean Perceptual Age	12													.73	.46	.82	.54
Eye-Motor Coordination	13														.31	.40	.43
Figure Ground	14															.41	.22
Form Constancy	15																.14
Position in Space	16																

*The closer the cell value is to 1.00, the greater the relationship between the two tests it represents.

TABLE 7

COMBINED GROUP INTERCORRELATIONS BETWEEN ALL SCALES AND SUB-SCALES FOR PRE-POST TEST DIFFERENCE SCORES

		Stanford-Binet M.A. 1	ITPA Total L.A. 2	1. Auditory Decoding 3	2. Visual Decoding 4	3. Auditory-Vocal Association 5	4. Visual-Motor Association 6	5. Vocal Encoding 7	6. Motor Encoding 8	7. Auditory-Vocal Automatic 9	8. Auditory-Vocal Sequencing 10	9. Visual-Motor Sequencing 11	Frostig-Mean Perceptual Age 12	Eye-Motor Coordination 13	Figure Ground 14	Form Constancy 15	Position In Space 16
Stanford-Binet Mental Age	1		.07	-.04	.01	-.03	.02	-.02	-.06	.05	.10	.20	.20	-.26	.02	.15	.50
ITPA Total Language Age	2			.48	.34	.33	.45	.38	.31	.27	.40	.23	.17	.01	-.01	.13	.23
1. Auditory Decoding	3				.08	.00	.00	.09	-.01	-.04	.14	-.14	.24	.22	.13	.09	.13
2. Visual Decoding	4					-.18	.07	.02	.12	-.06	.03	.15	.22	.17	.22	.23	-.25
3. Auditory-Vocal Association	5						.08	.12	.06	-.06	.21	.02	-.30	-.15	-.24	-.13	-.12
4. Visual-Motor Association	6							.02	.06	.18	.13	.01	-.11	-.55	-.09	.08	.11
5. Vocal Encoding	7								.01	.03	-.04	.10	.15	.13	-.17	.08	.12
6. Motor Encoding	8									.08	.09	.01	-.01	.25	-.05	-.18	-.03
7. Auditory-Vocal Automatic	9										.02	-.07	.20	-.05	.09	.14	.30
8. Auditory-Vocal Sequencing	10											.26	-.03	-.14	.03	-.07	.28
9. Visual-Motor Sequencing	11												.04	-.01	.30	-.10	-.02
Frostig-Mean Perceptual Age	12													.35	.42	.79	.35
Eye-Motor Coordination	13														.18	-.01	-.12
Figure Ground	14															.14	-.22
Form Constancy	15																.03
Position in Space	16																

measures. We can say that short-term growth in Stanford-Binet IQ will not necessarily reflect growth in other more specific areas of cognitive functioning.

Further generalizations from this portion of the data are hampered by the lack of reliability information for the various scales (i.e., how stable these measures are over time). This will be studied in the second phase of this research.

Table 8 shows a test of the association between level of pretest performance on the Stanford-Binet and subsequent IQ point gain during the program. The entire sample was divided above and below an IQ of 100 and also above and below 10 points of subsequent IQ gain. The Chi Square (X^2) value obtained (N=100) was significant ($<.001$). This suggests that if a child did well on the Stanford-Binet before the program began, he would tend to do better when tested at the end of the program than the child who did poorly when tested in the beginning.

TABLE 8

CHI-SQUARE TEST OF RELATIONSHIP BETWEEN STANFORD-BINET PERFORMANCE AND SUBSEQUENT IQ GAIN

	IQ 100 and Below	IQ 101 and Above	Total
10 Point Gain and Below	38	33	71
11 Point Gain and Above	4	25	29
Total	42	58	100

$X^2 = 13.21$ (df=1) $p < .001$

Analysis of Group Differences

Group Differences in Mean IQ at Beginning of Program

Differences in IQ found before the program began are meaningful to investigate in order to help explain later results. It has been shown that brighter students gained more in IQ during the program period and also that Stanford-Binet performance is related to performance on several of the ITPA scales. Table 9 presents the means and standard deviations for the comparison groups and Table 10 the analysis of variance among and within these groups as a test of the statistical significance of the mean differences (ANOVA).

TABLE 9

MEANS AND STANDARD DEVIATIONS FOR PRE-TEST STANFORD-BINET IQ

	Willow Center	Ireland Center	Control	Boys	Girls
$\bar{X}$	102.7	96.5	100.2	97.5	101.9
Sd	11.3	8.25	8.85	11.20	5.64

To test for statistical significance of mean differences among groups seen on Table 9, a 3x2 factorial ANOVA randomized block design was used (balanced before the data were collected). To read the ANOVA tables, refer first to the source column. The "treatment" row is the test of significance for mean differences among Willow, Ireland, and control groups. The "sex" row analyzes the contrast between the sexes for the entire sample. The "treatment x sex" row tests the mean differences between each treatment group for both sexes--*i.e.*, the means for both boys and girls in each treatment group are compared (not shown are mean and standard deviation tables).

Table 10 shows that the mean difference between boys and girls on pre-test Stanford-Binet performance (See Table 9) had a probability of occurring less than 5 times out of 100 ($<.05$) which may be considered statistically significant for the purposes of this study. No other difference approached statistical significance.

TABLE 10

ANOVA OF COMPARISON GROUP DIFFERENCES ON PRE-TEST STANFORD-BINET

Source	Sum of Squares	df	Mean Square	F Value	P
Treatment	275.8	2	137.9	1.16	-
Sex	631.9	1	631.9	5.31	$<.05$
Treatment X Sex	144.7	2	72.4	<1.0	-
Error Term	8558.8	72	118.87		

Group Differences in the Amount of Time Between Pre- and Post-Testing

Because the time between testing could not always be controlled experimentally, it became necessary to test to see if significant time differences existed between groups. No statistically significant time differences between treatment groups or sex sub-groups were found. The average time between pre- and post-test for all children was 75 days (Sd 12.6) or about two and a half months.

Group Differences in Stanford-Binet IQ Points Gained Over the Program Period

Table 11 lists the means and standard deviations for IQ point gains for the comparison groups.

Table 12 shows that there were no statistically significant differences among these means. This is possibly because of the wide range of scores within each group. Striking is the greater gain of boys compared to girls (not statistically significant) which would not have been predicted on the basis of their pre-test performance differences.

TABLE 11

MEANS AND STANDARD DEVIATIONS FOR STANFORD-BINET IQ GAINS

	Willow Center	Ireland Center	Control	Boys	Girls
$\overline{X}$	7.6	3.5	4.3	6.4	3.9
Sd	6.49	4.07	7.73	3.90	7.33

TABLE 12

ANOVA OF COMPARISON GROUPS FOR STANFORD-BINET IQ GAINS

Source	SS	df	MS	F	P
Treatment	242	2	121.0	2.46	-
Sex	121	1	121.0	2.46	-
Treatment X Sex	132	2	66.0	1.32	-
Error	3539	72	49.15		

When the Willow and Ireland groups were combined and their means compared for pre-post differences in IQ, the difference was also statistically significant (p .01)* as anticipated. However, when the same was done for the control group, the pre-post difference was equally as significant (p .01).** This indicates that both experimental and control groups made significant IQ point gains during the period of the project.

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*f value 3.96, df 64
**f value 2.77, df 35

Group Differences in Months Gained in Various Aspects of Language Function (ITPA)

Total ITPA Language Age Gains

Table 13 presents the means and standard deviations of the mean differences between pre- and post-scores for total language age.

Table 14 shows the statistical analysis of these means. The difference between treatment means was significant and when further analyzed by t-test, only the difference between Willow and Ireland groups was actually significant ($p < .05$).

TABLE 13

MEANS AND STANDARD DEVIATIONS FOR TOTAL ITPA LANGUAGE AGE IN MONTHS GAINED OVER THE PROGRAM PERIOD

	Willow Center	Ireland Center	Control	Boys	Girls
$\overline{X}$	6.38	3.39	4.69	5.0	4.6
Sd	4.0	3.46	3.87	4.47	3.70

TABLE 14

ANOVA OF COMPARISON GROUPS FOR TOTAL LANGUAGE AGE

Source	SS	df	MS	F	P
Treatment	117.7	2	58.8	3.24	$< .05$
Sex	5.1	1	5.1	> 1.0	-
Treatment X Sex	36.9	2	18.45	1.02	-
Error	1305.8	72	18.14		

Sub-Test 1: Auditory Decoding or the Ability to Comprehend the Spoken Word

Tables 15 and 16 show the mean gains and the test for group mean gain differences in the ability to understand the spoken word. No significant differences appear due to the wide range of scores within each group.

TABLE 15

MEANS AND STANDARD DEVIATIONS OF GAINS IN MONTHS IN ABILITY TO COMPREHEND THE SPOKEN WORD (AUDITORY DECODING)

	Willow Center	Ireland Center	Control	Boys	Girls
$\overline{X}$	2.41	1.55	3.7	2.5	4.0
Sd	5.74	7.0	6.85	6.7	8.0

TABLE 16

ANOVA OF COMPARISON GROUPS FOR AUDITORY DECODING

Source	SS	df	MS	F	P
Treatment	74.0	2	37.0	>1.0	-
Sex	47.7	1	47.7	>1.0	-
Treatment X Sex	9.8	2	4.9	>1.0	-
Error	9105.2	72	126.5		

Sub-Test 2: Visual Decoding or the Ability to Comprehend Pictures and Written Words

Tables 17 and 18 show the mean gains and the test for mean gain differences in ability to comprehend pictures and written words. Again, because of the broad variation in amount gained within each group, no significant differences appeared.

TABLE 17

MEANS AND STANDARD DEVIATIONS OF GAINS IN MONTHS IN THE ABILITY TO COMPREHEND PICTURES AND WRITTEN WORDS (VISUAL DECODING)

	Willow Center	Ireland Center	Control	Boys	Girls
$\overline{X}$	8.9	4.6	7.0	10.2	6.2
Sd	7.93	9.69	9.30	9.69	8.0

TABLE 18

ANOVA OF COMPARISON GROUPS FOR VISUAL DECODING

Source	SS	df	MS	F	P
Treatment	371.9	2	185.95	1.0	-
Sex	262.2	1	262.2	1.0	-
Treatment X Sex	689.0	2	344.5	2.0	-
Error	19947.3	72	277.0		

Sub-Test 3: Auditory-Vocal Association or the Ability to Relate Spoken Words in a Meaningful Way

Tables 19 and 20 indicate the mean gains and the test for mean gain differences in the ability to relate spoken words in a meaningful way. Again, no statistical differences were found.

TABLE 19

MEANS AND STANDARD DEVIATIONS OF GAINS IN MONTHS FOR THE ABILITY TO RELATE SPOKEN WORDS IN A MEANINGFUL WAY (AUDITORY-VOCAL ASSOCIATION)

	Willow Center	Ireland Center	Control	Boys	Girls
$\overline{X}$	5.7	4.7	4.7	6.0	6.9
Sd	5.65	4.35	4.58	5.48	4.36

TABLE 20

ANOVA OF COMPARISON GROUPS FOR AUDITORY-VOCAL ASSOCIATION

Source	SS	df	MS	F	P
Treatment	18.6	2	9.3	1.0	-
Sex	105.5	1	105.5	1.51	-
Treatment X Sex	29.5	2	14.8	1	-
Error	5061.7	72	70.3		

Sub-Test 4: Visual-Motor Association or the Ability to Relate Meaningful Visual Symbols

Tables 21 and 22 illustrate the mean gains in months and the test for mean gain difference in the ability to relate meaningful visual symbols. The mean differences among treatment groups is significant and when these differences were further analyzed by t-test only, the mean difference between Willow group and the control group was significant ($p<.05$).

TABLE 21

MEANS AND STANDARD DEVIATIONS OF GAINS IN MONTHS FOR THE ABILITY TO RELATE MEANINGFUL VISUAL SYMBOLS (VISUAL-MOTOR ASSOCIATION)

	Willow Center	Ireland Center	Control	Boys	Girls
$\overline{X}$	14.19	5.0	1.65	10.9	4.1
Sd	10.3	7.75	8.0	10.58	8.8

TABLE 22

ANOVA OF GROUP MEAN COMPARISONS FOR VISUAL-MOTOR ASSOCIATION

Source	SS	df	MS	F	P
Treatment	2194.3	2	1097.2	3.34	<.05
Sex	776.0	1	776.0	2.36	-
Treatment X Sex	1868.6	2	934.3	2.84	-
Error	23656.9	72	328.6		

Sub-Test 5: Vocal Encoding or the Ability to Express Ideas in Spoken Words

Table 23 shows the mean gain in months for the ability to express ideas in spoken words. When the mean differences were analyzed by ANOVA, no statistical differences were found.

TABLE 23

MEANS AND STANDARD DEVIATIONS OF GAINS IN MONTHS FOR THE ABILITY TO EXPRESS IDEAS IN SPOKEN WORDS (VOCAL ENCODING)

	Willow Center	Ireland Center	Control	Boys	Girls
$\overline{X}$	10.2	4.62	3.0	9.0	5.36
Sd	6.10	5.48	6.08	5.83	5.74

Sub-Test 6: Motor Encoding or the Ability to Express Ideas in Gestures

Table 24 presents the means and standard deviations of gains in months for the ability to express ideas in gestures. As with the previous scale, these mean differences were not statistically significant.

TABLE 24

MEANS AND STANDARD DEVIATIONS OF GAINS IN MONTHS FOR THE ABILITY TO EXPRESS IDEAS IN GESTURES (MOTOR ENCODING)

	Willow Center	Ireland Center	Control	Boys	Girls
$\overline{X}$	7.2	4.9	5.9	4.6	9.9
Sd	8.97	5.74	7.35	8.97	7.55

Sub-Test 7: Auditory-Vocal Automatic or the Ability to Predict Future Linguistic Events from Past Experience

Tables 25 and 26 show the mean gains and test for mean gain group difference in the ability to predict future linguistic events from past experience. A very significant treatment group difference appears which, when analyzed by t-test, turned out again to be a difference between the Willow and the control groups. The differences between Willow vs. Ireland and Ireland vs. the control were not significant. The difference between the combined means of Willow and Ireland vs. the control also was not significant.

TABLE 25

MEANS AND STANDARD DEVIATIONS OF GAINS IN MONTHS FOR THE ABILITY TO PREDICT FUTURE LINGUISTIC EVENTS FROM PAST EXPERIENCE (AUDITORY-VOCAL AUTOMATIC)

	Willow Center	Ireland Center	Control	Boys	Girls
$\overline{X}$	12.2	5.12	2.39	7.65	6.46
Sd	6.40	6.24	6.0	6.40	6.96

TABLE 26

ANOVA OF GROUP MEAN COMPARISONS FOR AUDITORY-VOCAL AUTOMATIC SUB-TEST

Source	SS	df	MS	F	P
Treatment	1334.6	2	667.3	8.36	$<.001$
Sex	20.5	1	20.5	>1.0	-
Treatment X Sex	398.0	2	199.0	2.496	-
Error	5742.3	72	79.75		

Sub-Test 8: Auditory-Vocal Sequencing or the Ability to Correctly Repeat a Sequence of Symbols Previously Heard

Table 27 depicts the mean gains in months for the sub-test measuring the ability to correctly repeat a sequence of symbols previously heard. There were no group differences in gain on this measure.

TABLE 27

MEANS AND STANDARD DEVIATIONS OF GAINS IN MONTHS FOR THE ABILITY TO CORRECTLY REPEAT A SEQUENCE OF SYMBOLS PREVIOUSLY HEARD (AUDITORY-VOCAL SEQUENCING)

	Willow Center	Ireland Center	Control	Boys	Girls
$\overline{X}$	3.7	3.6	5.7	6.49	4.0
Sd	5.39	6.08	6.40	5.52	6.56

Sub-Test 9: Visual-Motor Sequencing or the Ability to Correctly Reproduce a Sequence of Symbols Previously Seen

Table 28 shows the mean gains in months for the comparison groups on the ability to correctly repeat a sequence of symbols previously heard. None of the group differences were statistically significant.

TABLE 28

MEANS AND STANDARD DEVIATIONS OF GAINS IN MONTHS IN ABILITY TO CORRECTLY REPRODUCE A SEQUENCE OF SYMBOLS PREVIOUSLY SEEN (VISUAL-MOTOR SEQUENCING)

	Willow Center	Ireland Center	Control	Boys	Girls
$\overline{X}$	2.41	.60	4.3	2.58	3.33
Sd	5.29	5.83	5.74	6.78	6.08

Group Differences in the Frostig Program

Tables 29 and 30 show the mean gains and test for mean gain differences among Willow children who were involved in the Frostig Program. Willow children who were not in the program and the second control group of non-Willow children not in the program are shown on Tables 29 and 30. A difference ($p < .001$) was found among all groups and further analysis by t-test disclosed that significant differences ($p < .001$) exist between Willow children with the training and both control groups.

TABLE 29

MEANS AND STANDARD DEVIATIONS OF MEAN FROSTIG PERCEPTUAL AGE GAINS FOR CONTRAST GROUPS

	Willow w/Program	Willow w/o Program	Control
$\overline{X}$	12.3	2.4	3.4
Sd	5.19	3.87	4.24

TABLE 30

ANOVA OF FROSTIG MEAN PERCEPTUAL AGE GAINS FOR CONTRAST GROUPS

Source	SS	df	MS	F	P
Between	897.4	2	448.7	30.78	$<.001$
Within	612.5	42	14.58		
Total	1509.9	44			

SECTION V

INTERPRETATION

Figure 1 contrasts pre- and post-test scores for the entire sample in all scales administered. With the exception of the Frostig figure-ground discrimination task, all average scores in the post-test performance showed improvement over the pre-test results. This same figure serves as a functional analysis of test-retest reliability of the scales given. The degree to which the lines run parallel would be indicative of reliability. On this basis, it might be concluded that while the ITPA scales appear to run parallel and are thus relatively consistent, the Frostig sub-scales tend to be inconsistent. As Table 5 indicated, all but two of the 16 scale scores analyzed showed net growth beyond the two and a half months expected.

Because of the two and a half months lapse between the pre- and post-testing, net gains can be estimated by subtracting two and a half months from the gross gain. By this procedure, it is seen that the Stanford-Binet scores and all the scores in the ITPA scales show gains above and beyond that expected. For example, Visual Decoding, or the ability to comprehend pictures and written words, gained 4.4 months beyond that expected for normal development. For Auditory-Vocal Sequencing, or the ability to repeat correctly a sequence of symbols previously heard, there was a gain of 4.3 months beyond expectation. A similar gain of 4.3 months was found in the Visual-Motor Sequencing scale, or the capacity to reproduce a sequence of symbols previously seen. The two Frostig sub-scales, the exceptions, were observed to be of insufficient difficulty to assess improvement since many of the children were able to achieve maximum scores during the first administration.

Figure 2 presents the mean gains in months for the treatment groups on all scales administered. This figure shows where gains were most prevalent. None of the differences between Willow and Ireland Centers were statistically significant although on all scales Willow surpassed Ireland in average gain. On all but three scales (Auditory Decoding, Auditory-Vocal Sequencing, and Visual-Motor Sequencing), Willow surpassed the control group. This difference was significant for Visual-Motor Association and Auditory-Vocal Automatic. The scales for which both Willow and Ireland showed greater improvement than the control group may be considered the areas where the CDP had specific positive impact. This means that in total language function (total ITPA language age), the ability to relate meaningful visual symbols (Visual-Motor Association Sub-Test), the ability to express ideas in spoken words (Vocal Encoding Sub-Test) and the ability to predict future linguistic events from past experience (Auditory-Vocal Automatic) are where both experimental groups appeared to profit more than the control group.

On three scales, the control group surpassed both of the experimental groups--Auditory Decoding, Auditory-Vocal Sequencing and Visual-Motor Sequencing). Because the control group tended to be from a higher socio-economic level, it could be speculated that this finding would pivot around socio-economic differences.

Figure 3 shows the pre-test mean performance of boys and girls on the Stanford-Binet and ITPA. With one exception, girls excelled boys on all of the scales. Six of the 11 differences between boys and girls achieved statistical significance. All but one of the tests requiring a vocal production showed a significantly superior performance on the part of the girls. This is consistent with previous research (see Sec. II, p. 19).

Although boys and girls seem to have a differential rate of growth on the various tasks measured, this does not seem to affect the degree to which they improve in a compensatory program. Figure 4 shows that boys tended to gain more than girls in seven of the 11 tasks. This is true especially on those tasks involving vocal behavior. This interesting finding will be explored further in future stages of this study.

The highly significant mean difference gain ($P<.001$) as a result of the Frostig Program points to the effectiveness of this type of intervention in meeting specific deficiencies of the culturally deprived child. This program succeeded in bringing up all the children exposed to it, to a maximum level of performance in the perceptual tasks involved. This suggests that the future use of this type of training should be encouraged both in individual cases and in mass programs where these types of perceptual weakness are diagnosed.

This finding would assume particular importance if these perceptual tasks are related empirically to later ability in learning to read. This is one aspect which the researchers hope to investigate in a longitudinal approach.

This research has indicated that much of what the Stanford-Binet measures is taken into account by the ITPA--the ITPA accounts for about 38 per cent of the variance between the two tests. As suggested by the intercorrelations, if a child performs poorly on the Stanford-Binet, which is the best global predictor available for future academic success, he will also tend to have an overall language weakness, as measured by the ITPA total score. More specifically, he will experience difficulty in the expressive aspects of language, _i.e._, when he must open his mouth to say something. It is heartening to observe that it is on those scales measuring expressive aspects of language that the CDP children showed their greatest growth.

The child who performs poorly on the Stanford-Binet may not necessarily be weak in the ability to comprehend words presented via speech, writing, or pictures. He is capable of making associations among symbols, _i.e._, selecting from a set of pictures the one which most meaningfully goes with a given stimulus picture. In other words, he may very well have the ingredients for an adequate answer to a question, but he may fail it because he cannot vocalize the response. As was observed previously in the literature, the results of this study indicate that the deprived child does not experience as serious a problem when he is free to express himself by means of gestures (Deutsch, 1964).

This finding points rather strongly toward the need for exercising the deprived child in verbal expression. It is a popular belief that the culturally disadvantaged child is most sorely lacking in exposure to stimuli. This belief may be true, but it is not as important as a child's inability to express his experiencesverbally.

As one might expect, the child who is able to verbalize his experiences will be in a better position to profit more from school activities. It was further found in this study that those children with higher Stanford-Binet scores (reflecting their verbal capacity) were able to capitalize and gain more in verbal competency.

Undoubtedly, this may also reflect their ability to relate better to the teacher, to get more of what they need, and to receive more reinforcement as well.

To summarize the major findings of this preliminary report:

1. Over a short test-retest span, the Stanford-Binet Intelligence

Scale and the Illinois Test of Psycholinguistic Ability appear to be relatively stable measures while the Frostig Developmental Test of Visual Perception does not seem to be at this age level.

2. The brighter the child (i.e., the better his Stanford-Binet performance), the more he can be expected to gain from a compensatory experience of the type supplied by the Cleveland Child Development Program. Future programs should consider this fact in light of their goals. It is very easy to develop a tendency to teach only those who respond the most or the quickest.
3. While enriching the disadvantaged child's sphere of experience is an important goal for a compensatory program, it should not take precedence over helping the child put into meaningful language those experiences which are already his. This study indicates that vocabulary and grammar are the weak links between the disadvantaged child and future academic, and for that matter, life success. The 1966 Cleveland Child Development Program made great strides forward in strengthening these links. Further increased emphasis in this area is certainly warranted, however.
4. It has long been known that boys and girls develop at different rates in different areas of function. This study suggests that boys develop vocabulary and grammar at a somewhat slower rate than do girls. Girls, in fact, tend to surpass boys in most areas of language function. This should be taken into account when developing curriculum to meet the unique needs of boys.
5. Where specific visual perception deficiencies are found by means of the Frostig Developmental Test of Visual Perception, the Frostig Program for the Development of Visual Perception is an effective device for leveling off deficiencies both in-

dividually and in groups. (Because of some construction peculiarities, this test is best used by someone who has had experience with it.)

6. While the findings of this phase of the study are highly significant in themselves, perhaps the greatest contribution of this effort is found in the questions raised which can be explored in the next phase of this research. It will be of greatest importance to see:
    a. Which measure or combination of measures obtained on these children under the age of five will predict reading readiness? This is of special interest in view of the remedial uses to which diagnostic scales like the Illinois Test of Psycholinguistic Ability and the Frostig Developmental Test of Visual Perception can be put.
    b. Which of those children who profited from the Cleveland Child Development Program experience will continue to show appropriate cognitive growth and which factors will contribute to a stagnation or retardation in this growth? What will happen to those children who failed to show significant cognitive growth with Cleveland Child Development Program exposure? On what factors do these low or no-gain children differ from high-gain children?
    c. With the variable of family structure (i.e., intact vs. broken home) partialed out or controlled, what role does ethnic minority status play in cognitive development?
    d. Whether the boys in the sample who attained the same level of general cognitive function as the girls in the sample with the help of the Cleveland Child Development Program, will continue to remain about equal after kindergarten through third grade

exposure?

e. What qualitative and quantitative differences in cognitive functioning, if any, will exist among Cleveland Child Development Program children, nursery school children, and a new group of children (matched with the first two groups in socio-economic variables) who were exposed to no formal pre-school (social or academic learning experience) by the end of kindergarten?

f. And, specifically, to determine the stability of results given by the various psycho-educational measures used over a span of time and the potential predictability of these measures for future academic growth.

FIGURES

FIGURE 1

COMPOSITE PROFILE CONTRAST OF PRE-TEST SCORES AND POST-TEST SCORES FOR ENTIRE SAMPLE ON ALL SCALES

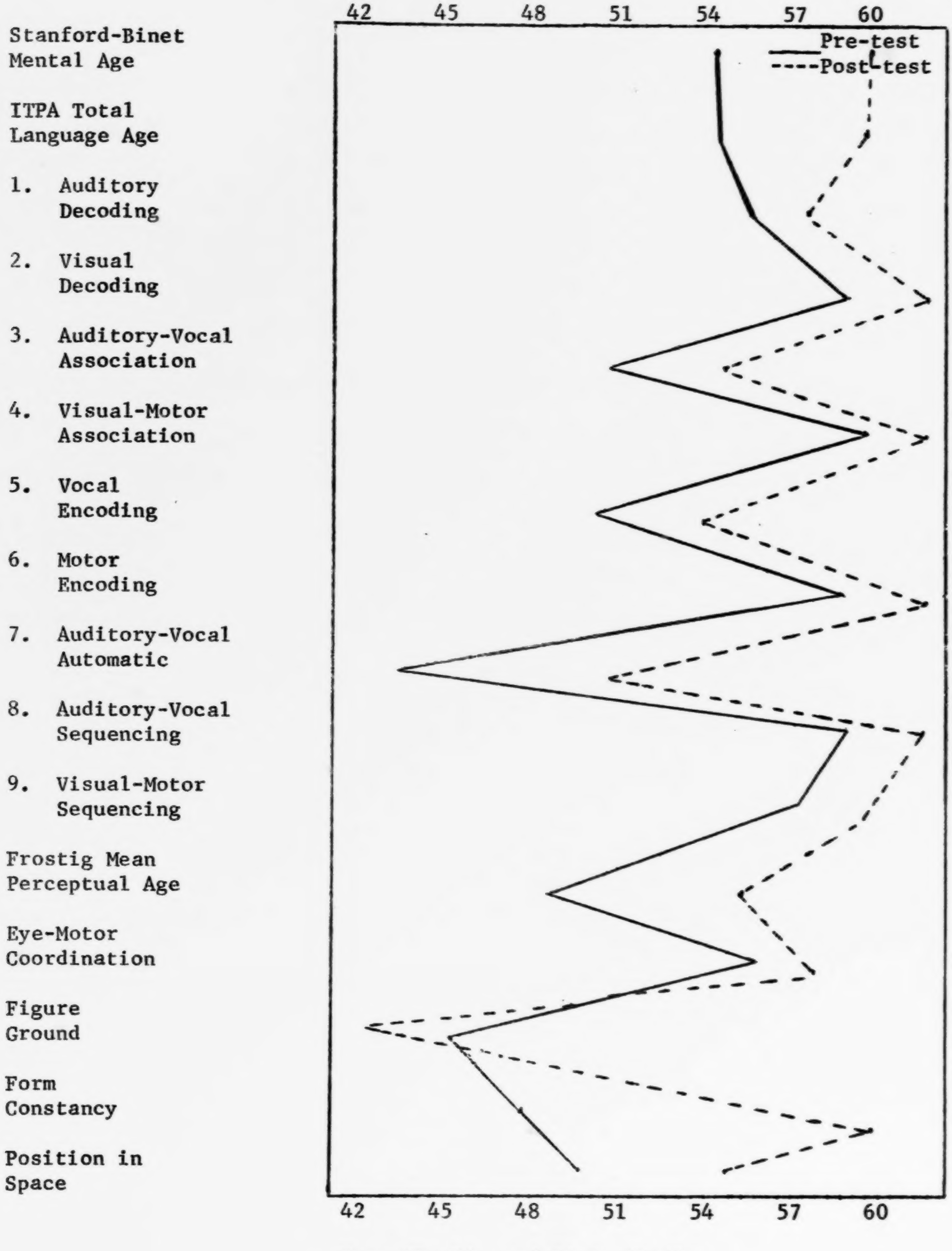


FIGURE 2

PATTERN PROFILE OF TREATMENT GROUPS FOR ALL SCALES IN TERMS OF PRE-POST TEST GAINS

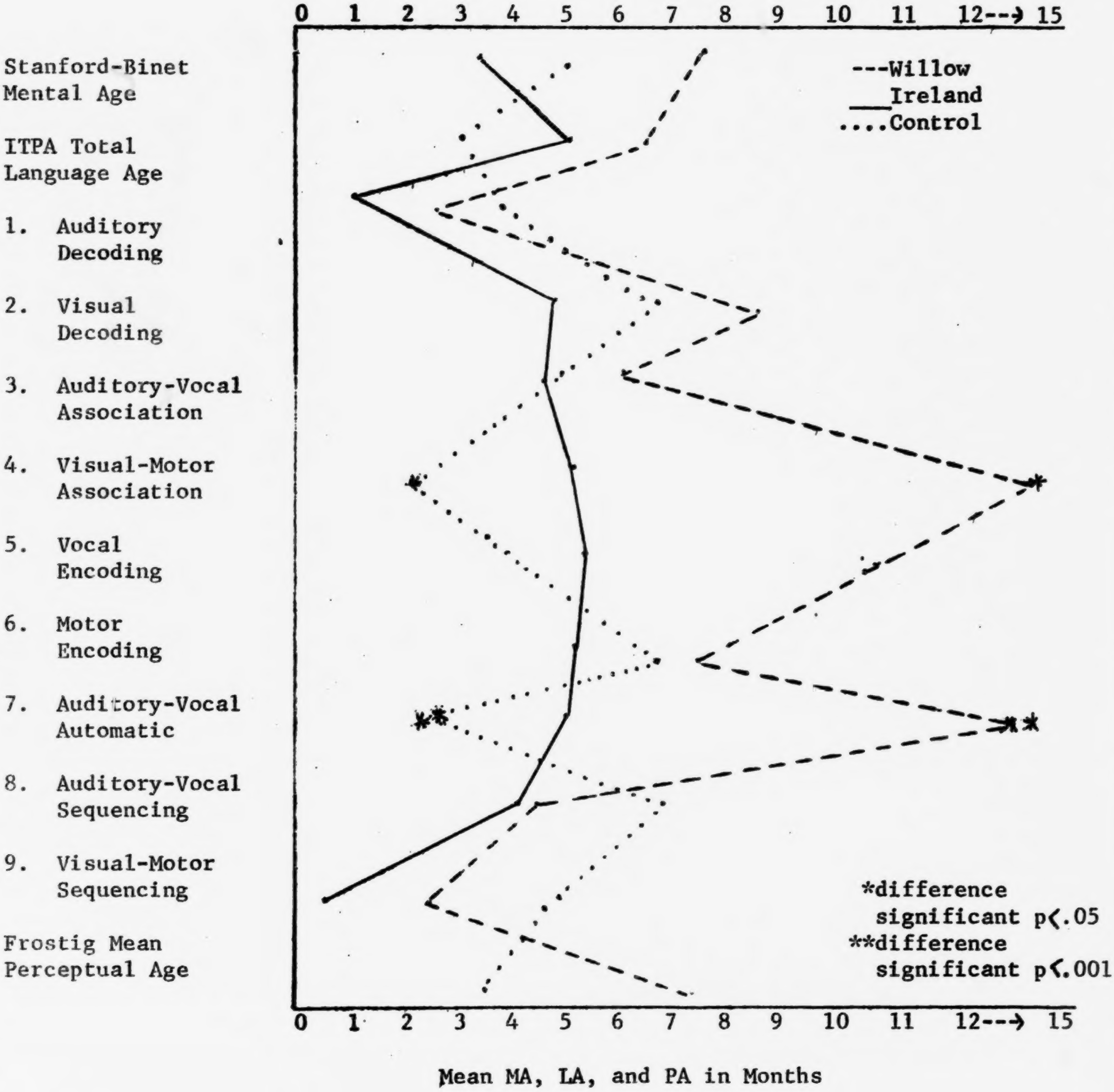


FIGURE 3

PATTERN PROFILE BY SEX FOR ALL SCALES IN TERMS OF PRE-TEST SCORE

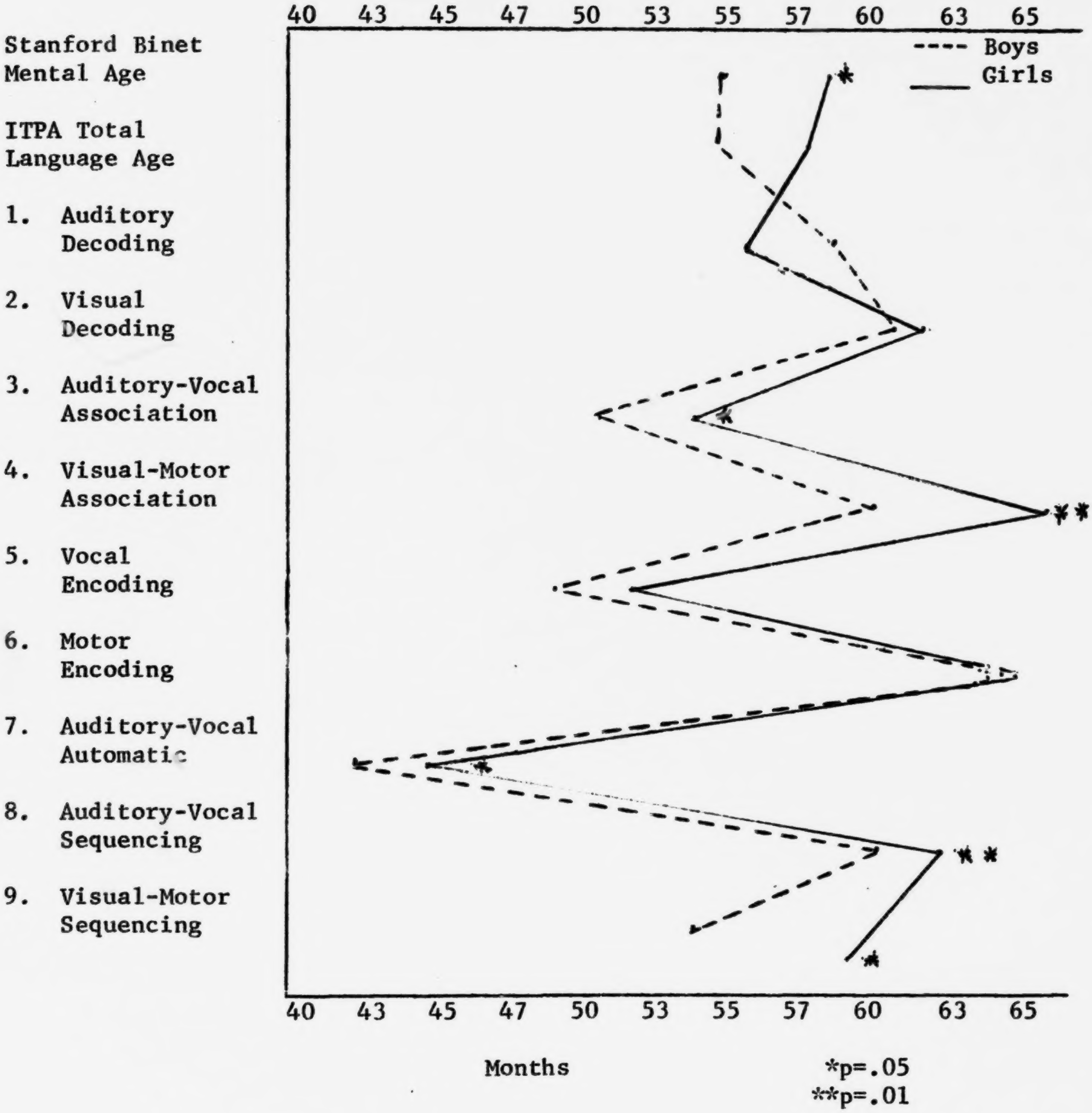
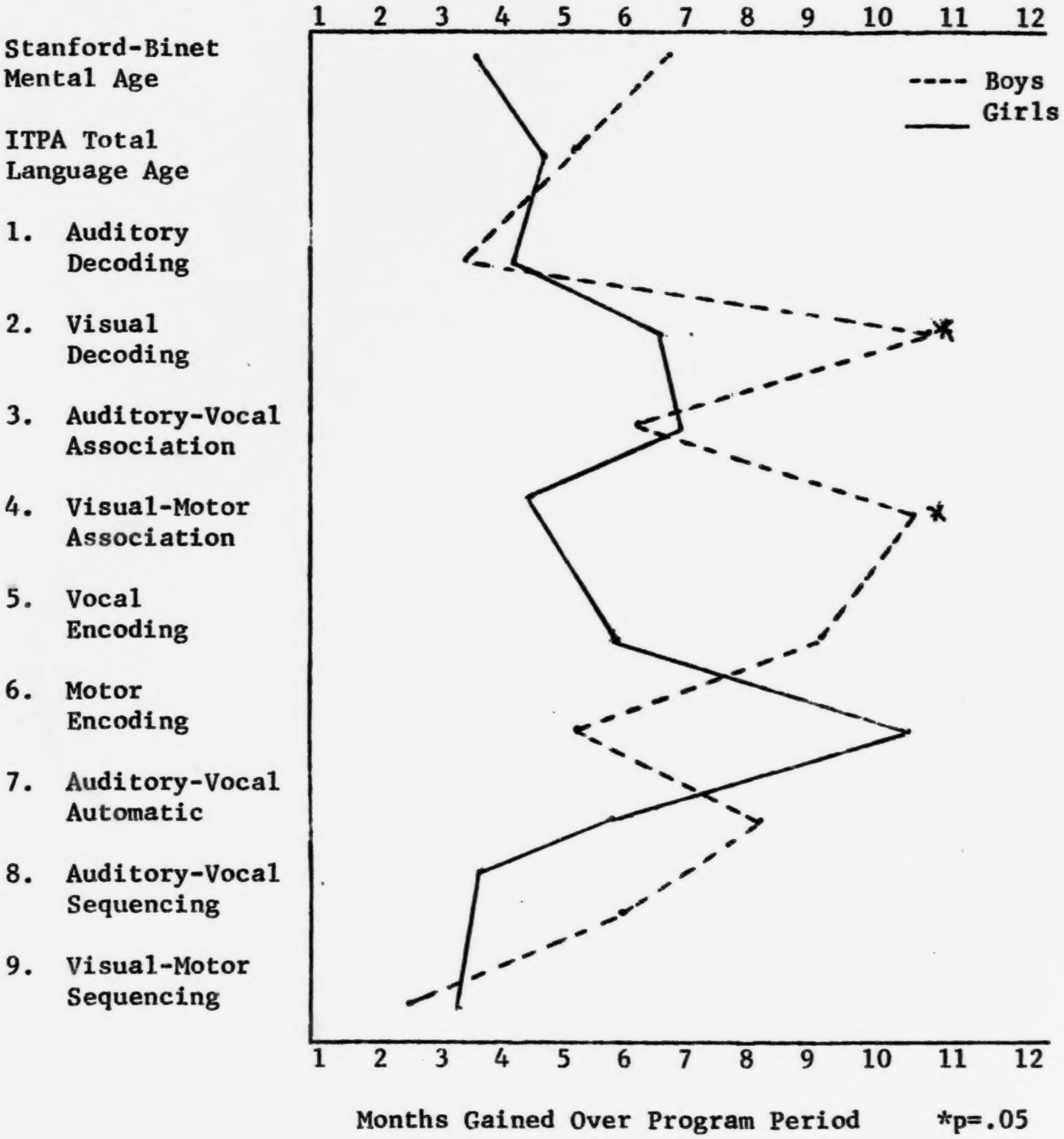


FIGURE 4

PATTERN PROFILE BY SEX FOR ALL SCALES IN TERMS OF PRE-POST TEST GAINS



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